# Perspectives

## Networks, Programming, and On-line Services

One of the annual traditions in the world of computing publishing is the exhaustive Subscriber Study. We've just completed the tabulation of *OS/2 Magazine*'s first such study, and I'm pleased to report that most of our assumptions about what you want to read about, as a business user of OS/2, were accurate. Still, based on information in the subscriber study, we're making a few minor adjustments, such as Mark Minasi's new column, "Under the Hood," and you'll see some other slight changes over the next few months.

Here are a few of the more interesting results, along with my interpretation. Please note: This study polled a random sampling *OS/2 Magazine*'s subscribers only, and only approximates the universe of serious OS/2 users.

- **You have heavy-duty PCs:** 82% of you use 33MHz 486 PCs or faster; 57% have 12 to 16MB RAM; more than 20% of you have 17MB RAM or more. This result confirms what we suspected: You're a serious computer user, running serious applications. Fewer than five percent of you use or manage OS/2 computers with 4MB RAM or less.
- **Most of you (more than 85%) are running Windows applications under OS/2.** That shows that *OS/2 Magazine* readers are practical users, not zealots. Your computer is on your desk to run applications. Where an outstanding OS/2 application is available, you'll use it, but when a Windows application offers better features for your business, or is the only game in town, that's what you'll use.
- **About 53% of you have HPFS disk partitions. More than 77% have FAT.** The fact that most of you have either formatted new hard disks, or reformatted existing drives, shows that you've decided that you're using OS/2 for the long haul.
- **Most of you are networked.** The most popular LAN is NetWare at 32% of subscribers. The other major networks you use are LAN Server (24%), a UNIX server (6%), LAN Manager (3.4%), and Vines (1.5%).
- **More than 75% of you write programs.** About 47% use C or C++, and 34% use REXX. Although most of you program, we've decided to stick with our original decision of *not* covering software development topics in *OS/2 Magazine*, since our sister publication, *OS/2 Developer*, more than adequately addresses those concerns. Instead, we'll concentrate on the other issues that all OS/2 users face—developers included. The only regular programming coverage we'll offer is Alex Lane's column, which will continue to explore the use of REXX for increased personal productivity.
- **Most of you (63%) are members of your firm's MIS/DP, IS, PC support, or equivalent departments.** About 95% of you offer computing assistance to coworkers or customers. Our survey indicates a strong need for issues regarding networking, database, systems administration, and other enterprise topics. We'll keep covering those topics, along with publishing personal-productivity articles.
- **About 73% of you are on-line.** About 44% our subscribers have CompuServe accounts, and about 30% are on the Internet. What about other services? Prodigy (13%), America Online (11%), MCI Mail (2%), and BIX (1.1%). Based on this feedback, we'll be continuing our presence on CompuServe's OS2AVEN forum, and our editors now have direct Internet mailboxes.

Another part of the survey confirmed that we're giving you the right types of articles. The survey told us that you don't want profiles of major advertisers and interviews with off-beat OS/2 users. Great! We've never printed those types of articles and we never will. What you did vote for is more of what we've offered since our premiere issue: how-to tutorials, explorations of new technology, hands-on product reviews mixed with practical news and analysis, new-product announcements, and tips 'n tricks. So, we'll keep the hard-core information coming.

Don't wait for the next annual survey to tell us how we're doing and what you want; Drop us a line, give us a call, send us e-mail. After all, we're here to help enhance *your* productivity under OS/2.

Alan Zeichick

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Editor-in-chief

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Reader Service No. 4

# Driving on the information superhighway

## THE RUSH TO CONNECT

BY AMY D. WOHL

It is only proper, in an issue of *OS/2 Magazine* that focuses on interconnection, to look at the role the personal computer will play as we move into that brave new world in which everything is connected to everything else via a global information superhighway.

So far, PC hardware manufacturers have been less than fully engaged in the information superhighway debate. A few companies (Apple and IBM, for example) have partnered up to build set-top boxes, thereby hedging their bets just in case PCs are priced out of the home market by lower priced set-top boxes as highway-connection devices.

Generally speaking, PC vendors have been scornful of the rush to populate a non-existent interconnection infrastructure with yet unspecified services. They point to the ventures companies have wasted vast sums of money on, such as artificial intelligence, pen-based systems, and multimedia. We can note that all three of these categories have something in common: they are not applications or business problems seeking solutions, but rather, technologies or groups of technologies that enable the building of better applications.

In fact, much of the frantic running about in search of the ultimate team to build the biggest and best information superhighway is really about two quite separate issues.

The first issue concerns capturing bandwidth. We have a finite amount of wireless capacity and appropriate real estate for building ground stations for wireless paraphernalia and supporting wires (of whichever technological age). Whoever has the biggest access to bandwidth and real estate has the best chance, all other things being equal, at capturing market share. With more than one possible technology capable of delivering information (telephone [via copper wire or fiber optics], cable [as in cable TV], radio wireless, and CDPD [cellular] for a start), partnering with companies that offer alternative technologies is a quick way to cover more bases.

PC hardware manufacturers have been less than fully engaged in the information superhighway debate

But, the possibility remains that a company might find a clever and cost-effective way to deliver all services through a single distribution technology. In this event, companies who invested billions to get quick access to alternate infrastructures (and billions more on debt service for their acquisition loans), may find themselves at a distinct disadvantage.

The second issue concerns content partners. Having a vast infrastructure is nice, but without a robust and varied set of services to offer prospective customers, this infrastructure is, like a mall full of empty stores, expensive and useless. Infrastructure providers need to be assured that there will be numerous services or else investing in distribution systems will seem uninteresting. Of course, there is also the possibility of participating in both the infrastructure and content sides of the equation as a supplier, with revenue flows from both. So, an interest in content is due, in part, to a desire to ensure an orderly start in an infant market and, in part, to a hope of participating in the content side of the market in an ongoing and highly profitable way.

The trouble is, no one really knows what the customers will be buying. Only a few million customers actually use on-line services today and most of them are fairly price-sensitive. They notice increases in prices and have clear budget limits for some types of services, such as entertainment and communications.

Builders of the information superhighway are counting on offerings being so seductive that customers will happily pay any reasonable price for high volumes of service. We have no proof that this will be the case.

When one large e-mail provider increased its rates sharply, many users stopped or curtailed their usage or moved to another provider. Sophisticated users are quick to find the best way to obtain, for example, Internet service, ensuring the lowest cost per message. Good pricing information is available in this price-sensitive market.

Convenience is certainly worth something. We'd gladly pay to be able to painlessly download any movie at any time with no need to return it to the video store or pay a per-day late charge. But, we probably wouldn't pay twice as much. There are limits, and we don't yet know what they are. Will the different viewing habits of the occasional viewer, who has no need to see anything twice, and the happy family with four small children who want to watch their favorite feature cartoon every day be accommodated? Would, for example, the use of a film be free after the third viewing?

If I use a PC rather than a set-top device as my interconnection point (and, therefore, gain more capability), can I do more things? Would this capability be subject to the designs of the PC manufacturers and hardware features (like higher screen resolution or the ability to display multiple stations), or software publishers, providing additional control and the ability to manipulate information taken off the highway? Or, do I only have the rights the information providers offer, regardless of the device I happen to use? In that case, why would I bother using a PC, except for the fact that it's more convenient for me not to change my usual seat?

Therein lies the dilemma of the PC in cyberspace. PCs are arrogant and aggressive objects, especially in the hands of knowledgeable users. PCs are less likely to be used in a constrained fashion. Today, a 486 is a powerful computer, but it pales by comparison to what's coming at, say, the level of a PowerPC or even a Pentium.

The real question is: What will the information superhighway do for us and how will we use it? There is no doubt that change is coming; the only question is how that change will be directed and who, in the end, will direct the power that access to unlimited information can provide.

*Amy D. Wohl is president of Wohl Associates, a consulting firm specializing in office information systems, personal computing, and end-user computing. She is also editor of the* Trendsletter, *a monthly newsletter on computer industry trends.*

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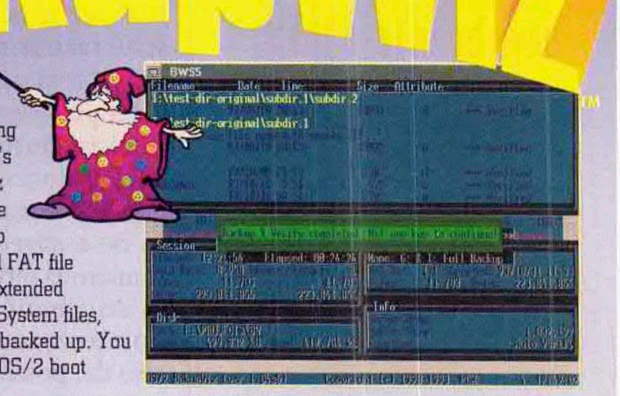

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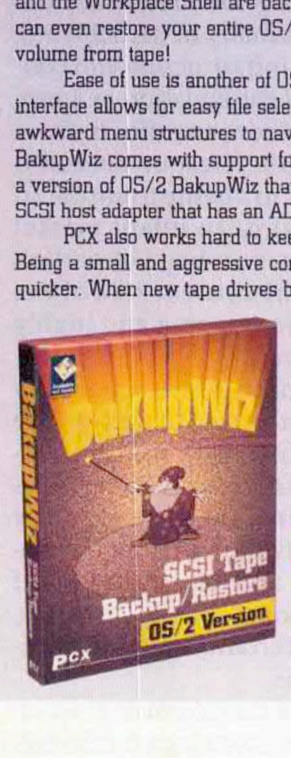

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Reader Service No. 7

# A Tale of Five Databases

## Alpha 4, DataEase, DataFlex, DB2/2, and R:BASE BY CRAIG M. BOBCHIN

In the world of business software, one area that business depends on for much of its livelihood has been pretty much left to flounder under OS/2. While many databases are available for DOS and Windows, relatively few have been developed for OS/2.

Among the vendors that are supporting OS/2 are Microrim, DataEase, Data Access, Alpha Software, IBM, and XDB. Several other vendors have OS/2 databases in the works. One stalwart database vendor called Revelation Technologies has recently made the decision not to pursue any more development of their Advanced Revelation for OS/2.

For this review, we chose five OS/2-specific databases. All but one have a version for DOS and some have Windows versions.

The five programs that we chose are: Alpha 4 for OS/2, DataEase 4.53 for OS/2, DataFlex 3.03 for OS/2, DB2/2 (also known as DB2 Desktop), and R:BASE 4.5+.

### How we tested

We tested the ease of use, features of each, the power to create applications, and the speed of imports and queries for each of the databases. In all cases, the same small employee database with two screens was created. For our data, we used a 30,449-record file in both ASCII and *.dbf* formats. The size of the data in ASCII was 4.5MB while the *.dbf* file was 6MB in size. All data was imported into the programs' native file format, even if it was able to use one of the other formats transparently. This way, all of the programs started from a level playing field.

The hardware setup was a 40MHz 386 with 8MB of RAM, OS/2 for Windows 2.1, a 90MB transportable Bernoulli drive, a Western Digital 540MB hard drive and a Quantum 170ELS hard drive.

All of the databases took up different amounts of disk real estate with R:BASE coming in as the biggest disk hog, needing about 15MB for a full installation. DataEase was the most conservative, chewing up only 7MB. The other three were all fairly consistent, needing between 10 and

**Table 1: Features and maximums.**

| | Alpha 4 | DB2/2 | DataEase | DataFlex | R:BASE |
|---|---|---|---|---|---|
| Tables per database | 9 | 32,767 | 2,000 | 255 | 1000 |
| Columns per Table or view | 128 | 255 | 255 | 255 | 2000 per database |
| Indexes Per Table | 15 | 32,767 | 254 | 15 | Table Limits |
| Records Per Table | 2 Billion | 4x109 | 16million | 16.7 Million | Limited by Disk Space |
| File Formats Accessed | .DBF | DB2 | .DBF, DataEase | Propriatary | RBASE, .DBF |
| Files Imported and Exported | Lotus 123, SYLK/MultiPlan, .DIF, ASCII Fixed Length, Delimited ASCII, Word Perfect Mail Merge, PFS:File | ASCII | ASCII Lotus 123, .DIF, .DBF, Multi-Mate, WordPerfect MailMerge | ASCII | Lotus 123, SYLK/MultiPlan, .DIF, ASCII Fixed Length, Delimited ASCII |
| Programming Language | Scripting | Cobol, REXX | Yes DQL | Yes | Yes |
| Query Language | No | Yes SQL | Yes DQL | No | Yes SQL |
| Transaction Processing | Partial | Yes | Yes | No | Yes |
| Cascading Updates/Deletes | Yes | Yes | Yes | Yes | No |
| Computed Columns | Yes | No | No | Yes | Yes |
| SQL Support | No | Yes | Separate Product | No | Yes |
| Memo Fields Per table | Up to 128 | 0 | 0 | 255 | Table Limit |
| Security | Partial | Yes | Yes | Partial | Partial Via SQL Grant/Revoke |

12MB for a full installation. If you don't install tutorials and sample databases, your disk requirements will be considerably less.

### ALPHA 4 FOR OS/2 V. 3

**Alpha Software**

Alpha 4 was not designed for the programmer with many years of experience, but for the business person with a need to create applications easily. Alpha 4 is capable of creating some complex applications, but I would not use it for anything mission-critical. The *.dbf* file format that Alpha 4 uses has very little support in the way of integrity constraints or data validations. Any program that can access a *.dbf* file can make modifications without problems.

Alpha 4 is a system with its own place in the database world. It has some nice features; it is easy for even a novice to create fairly complex applications. While it doesn't offer a programming language, it has a scripting language that can be used to record macros for playback. You can also record keystrokes to create a script.

Compared to earlier versions, version 3 now includes mouse support. All of the menus fully support the mouse, and four new scripting commands make your applications mouse-capable. Since OS/2 relies on a mouse, this is a nice addition.

Alpha 4 has multi-file data entry, which lets you use data-entry forms containing fields from different database tables. The data from each table can be directly modified. You can also add new records to more than one table from the same form and display detail records in a scrolling child region.

Alpha 4 has some Referential Integrity features. It can automatically delete any child records when the parent record is deleted and, conversely, it will modify the linked fields in the child table whenever they are changed in the parent.

Alpha 4 includes lookup tables and posting to different tables. It has an outliner to assist you in creating cascading lookup tables. User selections can determine which lookup list to display next. It offers conditional posting to allow you to define a posting operation to be performed based on the data existing at runtime. The value of a Status field, for example, could be used to print an interim invoice and hold off posting it until a later date.

#### Performance

Alpha 4 is not the fastest DBMS out there, but its performance is nothing to sneeze at. It took under a minute to create an index on one field in our test database. In this area, it was faster than DataFlex but slower than R:BASE. Locating data based on an index is nearly instantaneous. When searching without an index, the results come back somewhat slower.

Creating an application is not difficult. The screen and report building tools are easy to use and intuitive, and the mouse can be used for all design tools including moving a field or text. Line and box drawing tools are also included.

Alpha 4, being a non-programmable database system, does not have a real programming language in the style of DataFlex or R:BASE; instead, it has a macro/script language. The language is able to handle any task you can think of. It supports conditional ifs and loops, along with support for variables.

A script can be called from a key press, triggering such actions as entry or exit from a field or a menu choice. Scripts can be used to create dialog boxes to prompt the user for information or just to display a message.

Alpha 4 is a nice end-user program that is useful for creating single and multi-user applications. The tools are top notch and, while it is not a speed demon, it is fast enough for daily work. If you need to quickly create a system and have no need to access data via SQL, then Alpha 4 is definitely one you should look at. It fits the bill for a lot of applications and businesses that don't have the time or money to invest in a full MIS development team.

### DATAFLEX 3.03 FOR OS/2

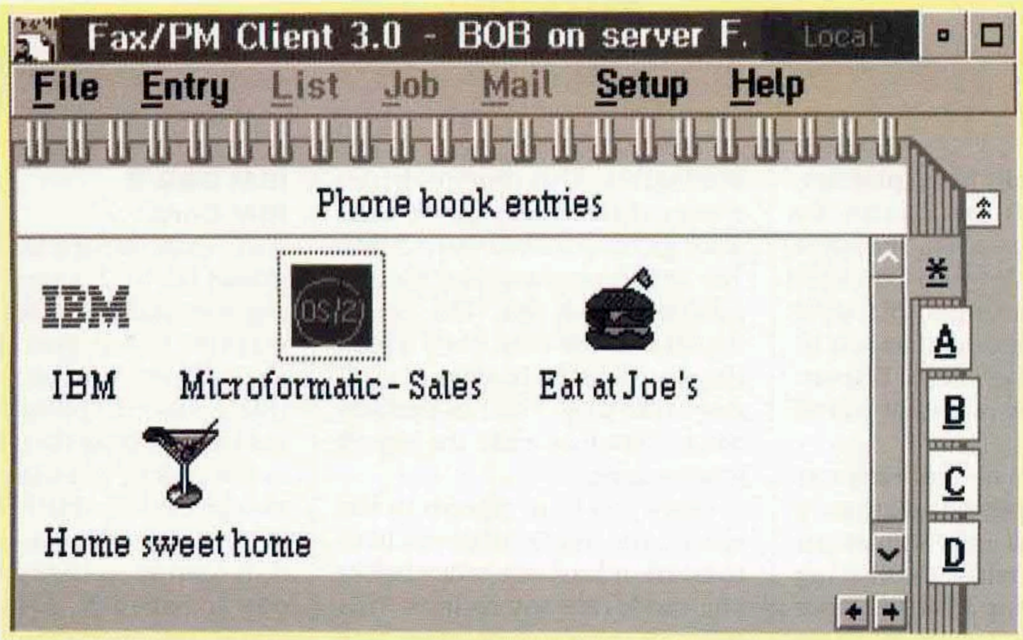
**Data Access Corp.**

Everywhere you turn these days, you seem to hear the phrase Object-Oriented Programming and Development (OOPD). What does this term really mean? Are any object-oriented database systems available? Since this article is not the proper forum to fully discuss object-oriented concepts and their benefits, I'll leave you with this: in object-oriented programming, objects are programmed once and then reused. It is considerably more complex than it sounds, but that description will have to suffice for now.

The second half of the question is a little more difficult to answer. Several languages are object oriented, but only one database system claims to be so. That program is DataFlex, and the object-oriented aspect is just one side of this DBMS. DataFlex has many other features that developers will like, including cross-platform support and ease of development.

#### Features

While DataFlex is a character-based system, it has the look and feel of a GUI-oriented program. It has Radio buttons, Check boxes, Pushbuttons and scrollbars, as you would expect



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from a graphically based program, but all objects are created by straight ASCII characters. The menu system is a cross between CUA-style pull-down menus and old style DOS popup menus that appear in the middle of the screen. You can have either type or both if you so desire.

DataFlex does not have any sort of comprehensive data dictionary and all field and entry validations must be done while developing data entry screens. However, once you add a field to a screen, you have a lot of control over what you can do with that field.

DataFlex has a fairly decent report-writing module that is easy to use, though you won't find any QBE (Query by Example) features. It does, however, have a QBF (Query By Form) that you can use to find records for editing.

You can use either of two methods to create applications; you can hand code them or you can use the applications generator. The applications generator will create code in one of two styles; you have a choice of either standard procedural code or object-oriented code. If you start with procedural, you can always change to object-oriented design later. However, if you start coding in object-oriented style, you can't change back to procedural.

### Performance

DataFlex is hampered by having very limited import and export facilities. It is only able to transfer data to and from ASCII files. While almost all programs can communicate in this mode, users with hundreds of thousands of records in legacy data could find this detail quite limiting.

To import a file, you must first create a program to import it. Creation is fairly easy if you use the Read utility. This prompt-driven system allows you to specify what fields go into what database fields. The import program must then be compiled and run. The actual import is a little slow, but it works. Here is where the benefits of OS/2 come into play. You can perform other operations while the import is being done.

Once you have records in the system, you will find that you have to create at least one index before you can locate any records. This series of steps can be confusing because you have to go through several menus and subsidiary programs to create indexes. Once the indexes are in place, you can use the records. Finding records based on an index is fairly quick, but searching unindexed fields can take quite a bit more time.

Creating applications can be an interesting experience. Since DataFlex is object oriented, every screen, field, menu, and popup is treated as an object. As an object, other objects can be based on it and inherit its characteristics and properties.

If you need a database that can run on OS/2 as well as DOS, Windows, and UNIX, then DataFlex deserves a thorough look. It is very powerful and has a lot to offer. It is the only object-oriented DBMS available for any of the common operating systems. It also has a very powerful language and the tools to use it.

A couple of things that may cause you to shy away from this product. For one thing, the import and export features are extremely limited, and the tools are not really covered in the documentation. However, if you take the time to learn and master DataFlex, you will not be disappointed with the results.

### IBM DB2/2
**IBM Corp.**

IBM's entry into the OS/2 database market is DB2/2, a version of their popular and powerful database manager for the mainframe. The first thing that you will notice about DB2/2 is that it is primarily a graphical DBMS. Unlike the other entries in this review, you will never have to leave the WorkPlace Shell (WPS) to use it. The most you will have to do is open up an OS/2 prompt window to issue SQL and other programming commands. IBM's DB2/2 is also a very stable database management system (DBMS) for OS/2.

At this point, DB2/2 does not yet fully qualify as an OS/2 implementation of the mainframe product DB2. In later releases, however, the two products will become more and more alike. IBM wants to make the Data Manipulation Language (DML) of DB2 and DB2/2 identical.

DB2/2 comes with a wide assortment of tools for you to use in creating and managing databases. It has tools to let you create databases and tables, data entry screens, reports, and menus. Some of these tools are hard to find and confusing to work with at first. Many of the operations can also be performed at a command line if they are phrased as Structured Query Language (SQL) statements.

The program is broken into three main components: the User Profile management system, the Query Manager, and the Command Line. The User Profile management system is what you use to create user IDs and passwords and otherwise limit access to your databases. It offers quite a bit of security, and to use a database you must first login to it.

The Query Manager is where you will probably spend most of your time. In my opinion, the QM is somewhat misnamed—you can do much more than just manage your queries and reports from it. The QM is really the command center for DB2/2. From it, you can create databases and tables, data entry screens, queries, reports, and programs.

The Command Line is an OS/2 command prompt with several parameters thrown in. It appears as a Windowed OS/2 prompt and is where you make most of your SQL queries and commands. The package offers a few other utilities, but they are designed for use in a server environment and to help you maintain and monitor multiple databases.

### Performance

DB2/2's biggest strength is its ability to connect seamlessly to IBM mainframes. While other vendors use gateways to connect, IBM employs a different technology; its DDCS/2 (Distributed Database Connection Service) software is based on IBM's DRDA (Distributed Relational Data Architecture) standard. Unlike gateway software, which must run on both the client and host machines, DDCS/2 runs only on the client, making it significantly less expensive.

DB2/2's LAN support is less advanced than its mainframe connectivity, however. It supports the NetBIOS protocol only. Surprisingly, it offers no support for Named Pipes. One factor that may contribute to DB2/2's sluggish performance is its use of NetBIOS, which is a relatively slow protocol. NetBIOS is also difficult to route through WANs.

While the conversion to 32-bit code has made DB2/2 faster than the 16-bit DB Manager, its performance is still only fair to middling compared with the other products in this review. DB2/2's score on our Ad Hoc Query test was good, but it came in close to the bottom on the Random Read, Random Write, and Mixed Workload tests.

### Database architecture

The most severe limitation of DB2/2 is that all database tables must be contained on one physical hard disk (though the transaction log can be stored on a separate device). If a database grows beyond the size of your disk, you cannot simply add an additional hard disk; you must replace it with a larger one.

Whenever you combine SQL with a 3GL such as C, a bind must be performed that determines the access path used. Most SQL databases perform the binding on the fly in case the table structure or indexes have changed. With DB2/2, the bind process must be run as a separate step. While prebinding makes the embedded SQL appear to run faster, having to rebind explicitly after a structural change is an inconvenience for the administrator.

If you're using OS/2, DB2/2's Applications Remote Interface (ARI) lets you store compiled 3GL code written in C, COBOL, or FORTRAN. You can also store REXX procedures on the server, and a precompiler for embedded SQL is available for all of these languages. The ability to access OS/2 DLLs lets developers enhance the core functionality of DB2/2 if they're willing to do some programming.

DB2/2 supports a smattering of advanced features. Cost-based and rule-based optimization are provided. The cost-based optimizer stores a wide array of statistics, though it does not store a histogram of the data in the manner of Ingres Server and Sybase SQL Server. DB2/2 has no built-in auditing feature. Like DB Manager, DB2/2 supports declarative referential integrity, but offers no support for triggers, which are useful for enforcing business rules or as an alternative method for maintaining audit trails. On-line backup is not currently supported, but is planned for the next release.

DB2/2's greatest strength is its ability to connect transparently with IBM databases on other platforms, especially mainframes. Although it is not a fast performer, it is one of the least expensive of the SQL databases, so it offers a good price/performance ratio. If you're not running LAN Server and OS/2, or if your database is growing rapidly, you should not choose DB2/2. It is best suited for IBM shops with a need to connect to mainframe databases.

DB2/2 is a large-scale client-server RDBMS. It is primarily for downsizing from mainframes to network systems. While you can purchase it as a stand-alone system, it isn't designed to compete with the likes of DataEase, or R:BASE. Its tools, while solid, are no great shakes. The performance with the sample data was good but not astronomical. If you need to share data with mainframes or you want DB2 for the PC, this product may be for you.

## DATAEASE FOR OS/2 4.53

### DataEase International

Most databases can be broken up into two categories; Programmable and nonprogrammable. DataEase, 4.53, falls into a gray area in between the two. It is a menu-driven system that can lead even the most novice database user through the sometimes daunting task of database development.

By using the menus, you can accomplish virtually every creation and administration task. This makes DataEase perfect if you need to get a database system up and running quickly. For the more experienced developers, custom-defined-functions (CDFs) can be programmed in C, Assembler, or another supported language. CDFs are useful in extending the features of the DataEase development environment.

DataEase comes with the usual assortment of database tools: a report generator, QBE capabilities, and the DataEase Query Language (DQL) for application development. DataEase SQL Connect lets you develop applications that access data stored in SQL Server, Oracle Server, and IBM's OS/2 EE Database Manager and DB2. Different versions of SQL Connect are available for each server you need.

Due to its menu-driven, tour-guide-like interface, application development in DataEase is very easy. DataEase has field-dependent menus that get displayed across the top of the screen, and a status line across the bottom that indicates the current assignment of the function keys. The mouse gives you point-and-click access to menu choices as well as function-key commands.

DataEase also uses dialog boxes to lead you through the more complex development procedures. For example, when creating links among different tables, a Relationship dialog box appears with prompts asking you for the table and field names to be joined. These features make it very easy to create multi-table forms and applications with DataEase.

The DataEase Query Language (DQL ) is not a programming language but is useful for creating complex reports that are beyond the capabilities of the Quick Reports report generator. DQL has 150 available functions and operators and is menu-driven. DataEase guides you through building the code, one step at a time. All options are displayed along the top of the screen, when you select the number preceding the suggested option, the operator is added to the procedure.

### Performance

DataEase is a bit slow on the performance side. It imported the records in a couple of minutes, but spent over three hours creating three indexes. Before you import, you must have a database and form defined. You then have to import all of the fields or just the ones that are on the form that have matching names in both files. You have no options to import only selected fields. Nor is there any provision for importing only selected records.

Viewing data is easy. While in a data entry form, you can instantly see a Browse list of the database you've created by pressing <Shift +F1>. If you press <Shift+F1> again, it will take you back to the form view.

Fields are created while you create forms. It is not possible to create a form after creating a database table. A form must appear on at least one screen to create a field. Luckily, it is easy to create a field; dialog boxes let you select field types, lookups for default values, and ranges. You create indexes at the same time, which means that you don't need to switch to an index-creation routine.

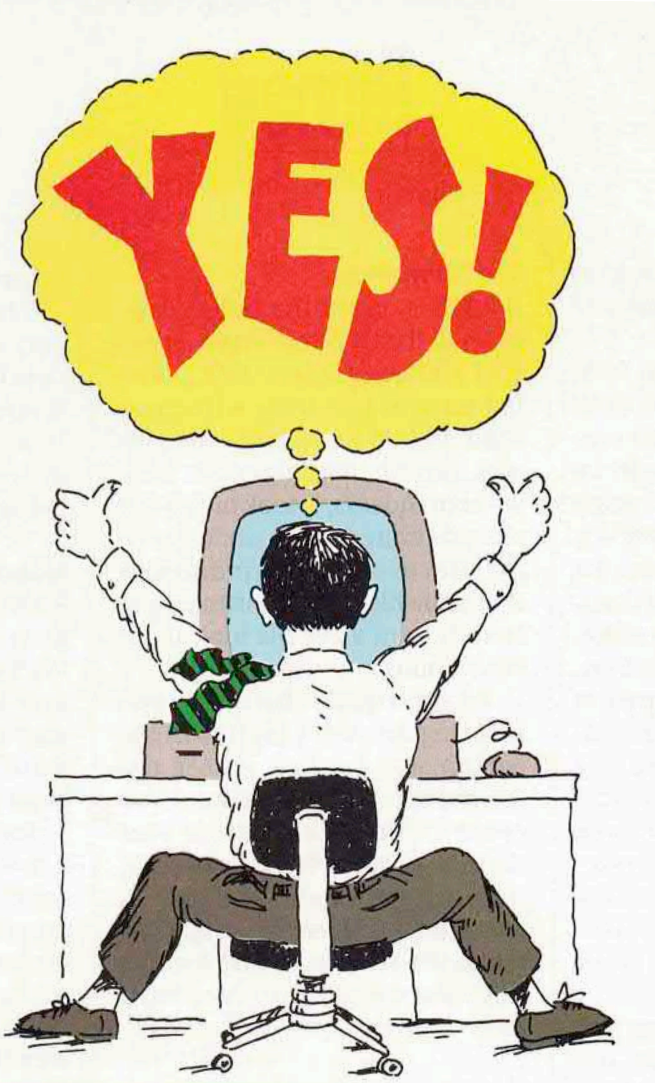
DataEase has a form of Query by Example (QBE). QBE makes it simple to query one or more tables. The Quick Reports menu steps through each of the basic QBE elements, including the record criteria, sort order, report format, and output. You can use predefined templates, the default columnar format, or you can have reports that are based on your data-entry screens. Developers can use DQL at any time during the reporting process to define more complex record-selection criteria. Querying on indexed fields was quick and no noticeable delay was evident in retrieving records from our test database. Unindexed queries took more time but no longer than the same query under Alpha 4.

One feature that is unique to DataEase is the addition of security. Each database must have a user and a password. Security can be applied at the database level as well as the field level. You can choose from seven security levels. You can easily define passwords, default-screen attributes, and start-up menus.

DataEase is an easy-to-use tool with enough power for most tasks. Its menu-driven interface makes it especially accessible to less experienced users. If rapid applications development is a prime consideration, and you are not too concerned with application speed, then DataEase is a good choice.

### R:BASE 4.5 PLUS
### Microrim

In the world of OS/2, precious few database vendors have been around since the beginning and know about the operating system. Even fewer have also been in the DOS database world from the beginning. Microrim of Redmond, Wash. is one such company. For years, they have been producing one of the few databases that runs on DOS and OS/2. They have just shipped a new version of their flagship DBMS R:BASE. Version 4.5 plus adds over 45 new features and



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programming commands that make it even easier and faster to manage your data.

R:BASE has support for the ANSI 89 level 2 SQL built into the database engine. The engine also supports limited referential integrity by enforcing both primary and foreign keys at the engine level. However, the product offers no support for cascading updates and deletions. While not a serious flaw, it is something that needs to be worked on.

The database engine supports several different datatypes, including autonumbered columns, text up to 1,500 characters, date and time, a new combined date/time format, currency, three other numeric datatypes, and a note type for those who need a lot of text. Note fields can be up to 4k in length.

You can create tables using one of two methods; either from the R:BASE command line issuing a create-table command via SQL or the easy way, using the database-creation tools. This section of the program allows you to create, delete, and modify various database components. Anything from tables, indexes, data-entry rules and data-integrity constraints, as well as both foreign and primary keys, are operated on here. Since all data-integrity rules are stored at the engine level, few errors will be introduced into your data.

R:BASE offers a robust programming language that can be used to build applications. The applications generator that is built into R:BASE is one of the best and quickest available for automatically creating programs for you. The applications generator will create all or parts of your application and, by using the interactive debugger, you can ensure that no bugs exist in your programs.

### Performance

R:BASE is one of the fastest databases in the DOS world and retains that quickness under OS/2. Locating records in a table with more than 30,000 records via indexes was almost instantaneous and, without indexes, it took only a few seconds more. It took under seven minutes to create two indexes on that same file and importing those records from a *.dbf* file took about five minutes.

R:BASE is quick—but queries and indexing are only a portion of the performance question. R:BASE also has speed in the applications development area. Once you create your tables and other database objects, such as forms, reports and queries, tying them together in an application is also an issue. R:BASE handles this job as well as it does everything else.

### Creating applications

The applications generator and programming language will allow you to create and tie everything together in a simple and efficient manner. You can have R:BASE create a full system for you based on the definition of a single table.

You have to create the menus, reports, forms and queries, and then have R:BASE create an application for you. Menu choices can have more than one action, and forms can have field-level popup menus and other validations as you see fit. Reports can be sent to the monitor, printer, or both. The report writer is band oriented and you can lay out your fields in any format that you want. On both forms and reports you can move your fields and text by clicking and dragging the mouse. By pressing the right mouse button, you can bring up a screen that allows you to define field-level help, colors, and other options.

The programming language is easy to follow even for a novice developer, and you can pretty much do anything in an application that you want to. It also includes a very good interactive debugger.

### Nobody's perfect

R:BASE is not flawless; like any program, it has its good and bad points. We've looked at the good ones, now let's see what problems you may encounter. Fortunately, few exist, and many of them may be based on my own personal opinion.

For starters, the program displays a marked lack of connectivity to other file formats. R:BASE uses a proprietary database format and is limited to that format and connection to *.dbf* files. It offers no support for moveable/resizeable windows, which is not necessarily a drawback. Most users will be able to live without the ability to open another data entry form from an already open one.

Another problem that I see is R:BASE's lack of support for cascading updates and deletes. Since R:BASE has support for both primary and foreign keys, it seems logical that they would take this ability to the next level.

If you need a fast, flexible DBMS and can live with the lack of connectivity and proprietary database format, then R:BASE is a program that you should look at. It has a lot going for it, including a history of solid growth and updates.

### Final thoughts

While PC databases have been around since the dawn of DOS, OS/2 databases are a relative newcomer to the PC. Of the five we looked at, only one stands alone as both a GUI-based system and an

OS/2 database with no DOS relatives. Each program had its strengths and weaknesses, and your final choice should be based more on whether the program will get the job done for you rather than based on its features.

All of the products we looked at had equivalent features and capabilities. The interfaces of all were very different but equally easy to get used to. In all cases but that of DB2/2 , if you need to share data across DOS and OS/2 equivalent versions of each product are available on both platforms.

If you need access to data in *.dbf* formats and must share the data with other users or otherwise can't import it, you have two choices: Alpha 4 and R:BASE 4.5 plus. Alpha 4 is more of an end-user tool and, while easy to work with, it limits you in terms of connectivity and programmability. It offers no facilities to use data in any form other than *.dbf*. It does not support SQL or provide a programming language.

R:BASE, on the other hand, has a wonderful programming language and can use *.dbf* files in their native format as well as in its own proprietary database format. It too is lacking in connectivity options. It offers useful development tools, but you may want a more modern windowed interface. One thing R:BASE had over all the others is speed. It was the fastest at importing and indexing. Alpha 4 came close in indexing speed, and had no need to import the test data.

DataFlex may be the ticket for you if you want to get into object-oriented development. It has a very clean interface but suffers from slow performance. It is also the most language-based program. Learning the language is a bit slow, but will reward you with a lot of flexibility in the DataFlex environment. DataFlex is another program that suffers from lack of connectivity. It can only import and export from ASCII, and offers no support for SQL or server-based data.

DataEase is a nice all-around package. It is very quick to develop in, connects to SQL servers and other data through the use of a separate SQL-connect package, and has a very rich feature set. Unfortunately, it suffers from lackadaisical performance. It was the slowest at importing and indexing our test data. Query performance was not too bad, but could have been better. It has the added benefit of being only one of two systems that include built-in security.

The other program with security was DB2/2. This product is more than just an applications development tool. It is really more of a back-end database. While it has the necessary tools, creating applications is really not its prime function. It is really intended to be used for large-scale downsizing client-server systems. A few third-party tools are available to create front-end systems to DB2/2 that are both more powerful and easier to use than the ones that come bundled with it. It suffers mainly from poor import and export features.

---

*Craig M. Bobchin is the founder and president of CMB Systems Design, a microcomputer consulting firm located in Orange County Calif. CMB Systems Design specializes in applications development using a variety of database products.*

## RESOURCES

**Alpha 4**
Alpha Software
168 Middlesex Turnpike
Burlington MA, 01803
(617) 229-2924
Fax: (617) 272-4876
Price: $495 single user
Competitive upgrade $99
$389 for user LAN pack
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**DataEase**
DataEase Intl.
7 Cambridge Dr.
Trumbell, CT. 06611
(203) 374-8000
Price: $795 single user
$795 three-user LAN pack
$1,095 five-user LAN pack
READER SERVICE NO 155.

**DataFlex**
Data Access Corp.
14000 S.W. 119th Ave.
Miami, Fla 33186
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Fax: (305) 238-0017
Price $795 single user developer
$1,450 multiuser developer
$165 single-user run-time
$35 multiuser run-time
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**DB2/2**
IBM Canada Ltd. Laboratory
Information Development
21/986/844/TOR
844 Don Mills Rd.
North York, Ontario. Canada M3C 1V7
(800) 342-6672
Fax: (416) 448-6057
Price: $ 425 stand-alone version.
$2,495 client/server edition
$75 client
$75 query manager
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**R:BASE**
Microrim
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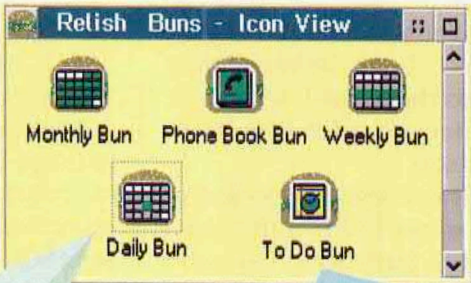

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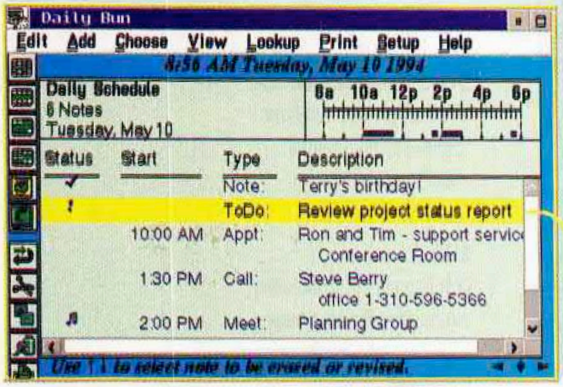
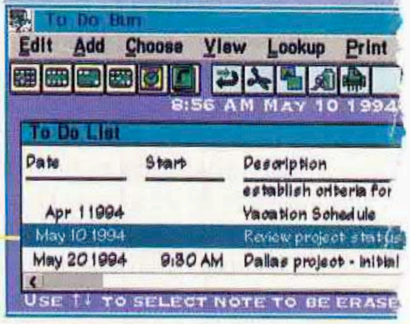


8:56 AM Tuesday, May 10 1994

Daily Schedule
6 Notes
Tuesday, May 10

| Status | Start | Type | Description |
|---|---|---|---|
| ✓ | | Note: | Terry's birthday! |
| ! | | ToDo: | Review project status report |
| | 10:00 AM | Appt: | Ron and Tim - support servic<br>Conference Room |
| | 1:30 PM | Call: | Steve Berry<br>office 1-310-596-5366 |
| ♪ | 2:00 PM | Meet: | Planning Group |

Use ↑↓ to select note to be erased or revised.



8:56 AM MAY 10 1994

To Do List

| Date | Start | Description |
|---|---|---|
| Apr 1 1994 | | establish criteria for<br>Vacation Schedule |
| May 10 1994 | | Review project status |
| May 20 1994 | 9:30 AM | Dallas project - initial |

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